

## Patent claims

1. A support with solder ball elements (1) for loading  
substrates (2) with ball contacts (3), the support  
5 (4) comprising the following features:
  - a layer of adhesive (5) applied on one side, the  
layer of adhesive comprising a thermoplastic or  
thermosetting material, the adhesive force of  
which is reduced when irradiated;
  - 10 - solder ball elements (1) which are arranged  
closely packed in rows (6) and columns (7) on the  
layer of adhesive (5) in a prescribed minimally  
permissible pitch (w) for a semiconductor chip  
(8) or a semiconductor component (9).
- 15 2. The support according to claim 1, characterized in  
that the substrate (2) to be loaded is a  
semiconductor wafer, and the support (4) comprises  
an arrangement pattern (11) for flip-chip contacts  
20 (12) of a multiplicity of semiconductor chips (8)  
of the semiconductor wafer.
3. The support according to claim 1, characterized in  
that the substrate (2) to be loaded is a  
25 semiconductor chip (8), and the support (4)  
comprises an arrangement pattern (11) for flip-chip  
contacts (12) of the semiconductor chip (8).
4. The support according to claim 1, characterized in  
30 that the substrate (2) to be loaded is a printed  
circuit board of a panel, and the support (4)  
comprises an arrangement pattern (11) for ball  
contacts (3) of a multiplicity of semiconductor  
components (9) of the panel.
- 35 5. The support according to claim 1, characterized in  
that the substrate (2) to be loaded is a wiring  
support of a semiconductor component (9), and the

support (4) comprises an arrangement pattern (11) for external contacts (14) of a semiconductor component (9).

5 6. The support according to claim 1, characterized in that the substrate (2) to be loaded is an intermediate wiring board of a semiconductor component stack (10), and the support (4) comprises an arrangement pattern (11) for stack contacts (16)  
10 of a semiconductor stack component (10).

7. A system for loading substrates (2) with solder contacts (3), the system comprising the following features:

- 15 - a support (4) with a layer of adhesive (5) on one side, the layer of adhesive comprising a thermoplastic or thermosetting material, the adhesive force of which is reduced when irradiated;
- 20 - solder ball elements (1) which are arranged closely packed in rows (6) and columns (7) on the layer of adhesive (5) in a prescribed minimally permissible pitch (w) for a semiconductor chip (8) or a semiconductor component (9) and,
- 25 - an irradiating device with a source of radiation and apparatus for selectively irradiating the support (4) to reduce the adhesion of the layer of adhesive (5) for loosening solder ball elements (1) at prescribed positions;
- 30 - a removal device for removing the loosened solder ball elements (1) and leaving solder ball elements (1) in an arrangement pattern (11) for flip-chip contacts (12) or ball contacts (3);
- 35 - a loading device for fixing the solder ball elements (1) remaining on the support (4) in a prescribed arrangement pattern (11) on contact areas (17) of the semiconductor wafer or

semiconductor chip (8) or the wiring support for semiconductor components (9);

- a pulling-off device for pulling the supports (4) off the ball contacts (3).

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8. The system according to claim 7, characterized in that the irradiating device comprises a laser beam source and comprises deflecting devices for scanning the laser beam for selectively irradiating the support (4) at prescribed positions.

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9. The system according to claim 7, characterized in that the irradiating device comprises a UV source and, for selectively irradiating the support (4) with UV rays, a mask holder with masks (18) for UV irradiation of the support (4) at prescribed positions.

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10. The system according to one of claims 7 to 9, characterized in that the removal device for removing the loosened solder ball elements (1) comprises a roller or a continuous tape, which are provided with tacky surfaces on which loosened solder ball elements (1) remain adhesively attached.

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11. The system according to one of claims 7 to 10, characterized in that the removal device for removing the loosened solder ball elements (1) comprises a roller or a continuous tape on the upper sides of which stripping bristles are provided.

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12. The system according to one of claims 7 to 11, characterized in that the loading device comprises a holder for substrates (2) to be loaded and a support holder for the support (4) with an arrangement pattern (11) of solder ball elements

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(1), as well as adjusting means for aligning the remaining solder ball elements (1) of the support (4) in the support holder with contact areas (17) of the substrates (2) to be loaded of the holder.

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13. A method for loading substrates (2) with solder ball contacts (3), which comprises the following method steps:

- 10       - producing a tape from support material with a layer of adhesive (5) on one side, comprising a thermoplastic or thermosetting material, the adhesive force of which is reduced when irradiated;
- 15       - arranging solder ball elements (1) in rows (6) and columns (7) on the layer of adhesive (5) in a prescribed minimally permissible pitch (w) for a semiconductor chip (8) or for a semiconductor component (9);
- 20       - selectively irradiating the support (4) to reduce the adhesion of the layer of adhesive (5) and loosen solder ball elements (1) at prescribed positions;
- 25       - removing the loosened solder ball elements (1) and leaving solder ball elements (1) that are fixed on the support (4) in an arrangement pattern (11) for a semiconductor chip (8) or for a semiconductor component (9);
- 30       - soldering the solder ball elements (1) remaining in a predetermined arrangement pattern (11) on the support (4) onto contact areas (17) of a semiconductor wafer or semiconductor chip (8) or wiring support for semiconductor components (9);
- 35       - pulling the support (4) off the substrate (2) to be loaded with flip-chip contacts (12) or ball contacts (3).

14. The method according to claim 13, characterized in that the support (4) is sprayed on one side with a layer of adhesive (5).
- 5 15. The method according to claim 13 or claim 14, characterized in that the solder ball elements (1) are adhesively attached onto the layer of adhesive (5) in rows, from dispensing nozzles arranged in parallel next to one another, in a prescribed  
10 minimally permissible pitch (w) for a semiconductor chip (8) or a semiconductor component (9).
16. The method according to one of claims 13 to 15, characterized in that a laser beam for selectively  
15 irradiating the support (4) to reduce the adhesion of the layer of adhesive (5) and to loosen solder ball elements (1) at prescribed positions is passed over the support (4).
- 20 17. The method according to one of claims 13 to 16, characterized in that the support (4) is selectively irradiated with UV rays through a mask (18) to reduce the adhesion of the layer of adhesive (5) and to loosen solder ball elements (1)  
25 at prescribed positions.
18. The method according to one of claims 13 to 17, characterized in that the support (4) is subjected to irradiation over a large surface area, and the  
30 support (4) is pulled off the ball contacts (3).